

P R O J E C T facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

CLEAN coal
TECHNOLOGY

PRODUCING METHANOL FROM COAL GAS— THE AIR PRODUCTS CLEAN COAL PROJECT

PRIMARY PROJECT PARTNER

Air Products Liquid Phase Conversion Company, L.P.
Allentown, PA
(A partnership of Air Products and Chemicals, Inc., and Eastman Chemical Company)

MAIN SITE

Eastman Chemical Company's Integrated Coal Gasification Facility
Kingsport, TN

TOTAL ESTIMATED COST

\$213,700,000

COST SHARING

DOE \$92,700,000

Non-DOE \$121,000,000

Project Description

Air Products Liquid Phase Conversion Company, L.P., is preparing to add new technology to Eastman Chemical Company's coal gasification facility in Tennessee. The project will demonstrate a new, cost-effective route for producing liquid fuels and chemical feedstocks from coal.

With support from the U.S. Department of Energy's Clean Coal Technology Program, the liquid-phase methanol synthesis process will be installed at the Kingsport, Tennessee, complex. The demonstration could be a preview of future commercial facilities in which clean-burning methanol is made from coal-derived gas either in stand-alone facilities or as an adjunct to gasification combined-cycle power plants.

The advanced process is the product of more than a decade of government-industry cooperative development. Originally tested at a small, DOE-owned experimental facility in LaPorte, Texas, it offers several advantages over current methods of making methanol.

Methanol is made today by passing a gaseous mixture of hydrogen and carbon monoxide (normally made from natural gas) through a bed of dry catalysts. The liquid-phase process suspends fine catalyst particles in an inert liquid. The liquid dissipates heat from the chemical reaction away from the catalyst surface, protecting it and allowing the gas-to-methanol reaction to proceed at higher rates. The process is ideally suited to the type of gas produced by modern coal gasifiers.

At the Eastman Chemical complex, the technology will be integrated with existing coal gasifiers to produce 80,000 gallons of methanol per day. The methanol will be evaluated as a fuel in boilers, vans, and buses, and as a chemical feedstock.

Program Goal

The production of affordable liquid fuels from non-petroleum sources is a strategically important goal of the Clean Coal Technology Program. Coal-derived methanol, which contains no sulfur or other impurities, could be used one day as a replacement for petroleum in transportation, in combustion turbines at gasification combined-cycle power plants, or as a chemical feedstock.

Project Partners

EASTMAN CHEMICAL COMPANY

Kingsport, TN
(host site and operator)

AIR PRODUCTS AND CHEMICALS, INC.

Allentown, PA
(technology supplier and cofunding)

ACUREX ENVIRONMENTAL CORPORATION

Mountainview, CA
(methanol testing and cofunding)

ELECTRIC POWER RESEARCH INSTITUTE

Palo Alto, CA
(utility advisor)

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CONTACT POINTS

William R. Brown

Air Products and Chemicals, Inc.
Allentown, PA
(610) 481-7584
(610) 706-7299 fax
brownwr@town.apci.com

Robert M. Kornosky

U.S. Department of Energy
Pittsburgh, PA
(412) 892-4521
(412) 892-4775 fax
kornosky@petc.doe.gov

Project Benefits

The United States needs future sources of alternative liquid fuels. With domestic oil production declining and imports rising, the potential for producing affordable liquid fuels from non-petroleum sources could one day prove both strategically and economically important. The Air Products Liquid Phase Methanol demonstration project offers an extremely attractive route to supplementing our liquid fuel supplies with methanol made from the abundant reserves of coal in the United States.

Methanol has a broad range of commercial applications. It can be substituted for or blended with gasoline to power vehicles. It is an excellent fuel for the rapid-start combustion turbines used by utilities to meet peak electricity demands. It contains no sulfur and has exceptionally low nitrogen oxide characteristics when burned. It can also be used as a chemical feedstock.

The technology to be demonstrated at the Eastman Chemical complex could one day be used as an adjunct to a gasification combined-cycle power plant—one of the cleanest and most efficient of 21st-century power-generating options. When the plant is not generating power at its full capacity, excess coal gas could be used to make methanol. The methanol could be stored on site and used in peaking turbines or sold as a commercial fuel. In this scenario, the cost of making methanol from coal will be competitive with that of world-scale methanol facilities.

The highly effective processing capabilities of the liquid-phase methanol synthesis technology make it much more efficient than conventional methanol synthesis techniques for processing the type of gas that is made by modern coal gasifiers.

At its peak, construction of the demonstration unit in Kingsport, Tennessee, will create about 110 jobs.

Cost Profile (Dollars in Millions)

	Prior Investment	FY95	FY96	FY97	Future Funds
Department of Energy *	\$8.4	\$3.6	\$11.8	\$18.2	\$50.7
Private Sector Partners	\$10.1	\$3.6	\$11.8	\$24.0	\$71.5

* Appropriated Funding

Key Milestones

FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02
	Design			Con- struction	Testing				Report- ing	
	Cooperative agreement awarded 10/16/92				Testing begins 12/16/96		Completed 2/1/01			
				Construction begins 10/2/95				Final report 12/28/01		